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ABSTRACT

The actual impact of research and demonstration projects in vocational education is evaluated. Criteria for a reliable research design are specified regarding sample size, sample selection, control groups, and economic and educational benefit and cost evaluation. The impact of research and demonstration projects is analyzed in the areas of curriculum, teacher education, learning processes, capital equipment and facilities, supportive services, and innovative input combinations. The actual contribution of these projects to vocational education is examined in two aspects: The characteristics of research and demonstration projects that satisfy the ideal criteria in actual implementation are discussed, and the extent to which educators and policy makers have made use of the research and demonstration projects is evaluated. The general conclusion is that although some demonstration projects have helped modify or improve instruction techniques, limitations still exist: (1) Lack of adequate research design or evaluation methodology, (2) abundance of descriptive studies, (3) weakness in survey technique, and (4) weakness of impact due to small sample size, limited population, or triviality of problem tested. A table displays a sampling of a variety of projects funded under Parts C, D, and I of the vocational education amendments. (NJ)

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An Analysis of the Impact of Applied Research and Demonstration Projects in Vocational Education

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I. INTRODUCTION

Since the landmark Vocational Education Act of 1963, total expenditures on vocational education research and demonstration (R&D) projects have been estimated at about $275 million, with more than 2500 projects supported by the Federal Government. A logical question for policymakers and funding agencies to ask is what is the impact or contribution made by these R&D projects to vocational education? This is an especially pertinent question since the Vocational Education Act, including its R&D provision, is scheduled to be examined by Congress during this year. Thus, the actual contribution made by these R&D projects must be assessed so that this information may be useful for policymakers.

This paper will first specify some important criteria for a R&D design that can be used in actual implementation and generalization. These criteria include the required sample size relative to the size of expected impact, the randomness of the sample selection, the control or comparison groups, and the economic and educational benefit/cost evaluation of these projects.

The major task of this paper is to evaluate the actual impact of these R&D projects. In order to evaluate their actual contributions to vocational education, it is necessary to identify two types of impact on vocational education: (1) the intermediate impact on vocational education such as the modification or revision of curricula, the reallocation of funds within the educational system (either at the local, State, or Federal level), the effects on students' aptitudes and school performance, the number of graduates produced, and the percent of graduates working in occupations for which they were prepared; and, (2) the final output of these programs, such as the labor market performances of these students in terms of wages, employment, and earnings or increased job satisfaction. Some of these impact evaluative questions are unanswerable given the nature of published materials and the limited resources of this assigned study. Nevertheless, this paper will provide a tentative assessment based on available R&D results and will also suggest a methodology for future analysis of the impact of applied

R&D projects in vocational education which should yield much more concrete results in terms of unambiguous estimates of net educational and economic impact.

II. General Criteria for Measuring the Educational and Economic Impact of R&D Projects

It is commonplace judgment that the major problems in the evaluation of social and educational programs are that the goals of these programs are vague, though the positive promises of such programs are strongly asserted, while the estimated end results of these programs demonstrate weak effects. The work concerning R&D projects in vocational education is no exception to this situation. Therefore, in order for meaningful application of the claimed results of any R&D program, several criteria should be fulfilled. These are:

1. Specification of the Objectives: One of the major tasks in developing a R&D project in vocational education is to specify the objectives of the project which are consistent with the objectives of vocational education overall. For instance, the objectives of R&D projects vary in terms of the point at which the researcher focuses on the process of the R&D project such as (a) enrollment in

advanced or new and emerging occupations;
(b) enrollment in advanced technical education programs, according to Section 108 of P.L. 90-576 in the U.S. Congress; or
(c) preparation of individuals for gainful employment. These stated objectives can be summarized in terms of three tangible measurements: employment gain, income change, and educational attainment. These objectives can be called "ultimate goals." There are other types of goals which can be called "intermediate goals" such as the improvement in students' scores or attitude in the vocational education, the improvement in student attendance in vocational education, or a sense of fulfillment of the vocational teachers after having developed a new program. It should be noted, however, that the achievement of certain "intermediate goals" is not necessarily consistent with the ultimate

goals. Furthermore, there may not be uniform agreement on the relative importance of these goals, but it is important that researchers and administrators recognize these alternative objectives and the necessity for assigning relative weights to them. Such a system of prioritized goals then allows one to focus the research effort on the most important outputs of the research or demonstration project.

2. Appropriate Experimental Design: For a R&D project to be useful for actual implementation, the project should have an appropriate experimental design. This appropriateness implies the random assignment of a target population to an experimental and a control group, and a sample size which will allow one to detect statistically significant effects should these exist. When natural

experiments are in question, there can be no random assignment, whereupon the choice of one or more comparison groups becomes critical. If the control or comparison group is not properly selected, the conclusions or the effectiveness of this study becomes uncertain. Therefore, regardless of the true facts of the case it becomes difficult if not impossible to detect whether such projects have any actual impact on educational performance.

The size of sample is also an important consideration in designing a study. If a study is carried in one classroom or with small number of students, the ability to infer from results of this small to a large universe becomes limited. For instance, it is very difficult to generalize the results of the demonstration project of 50 students

in an art education study by Lockette (1966) to other student populations in the country.

Another important consideration is the randomness of sample selection. Random assignment allows one to make inferences of causality with a degree of certainty which is simply not feasible when one uses other research designs. In addition, for a given target population in order to replicate the results of a R&D project, the sample participants should be randomly drawn from that population so that they are representative to the total population rather than a special group of participants. A serious source of bias in research design in most social and educational R&D projects continues to be self-selection bias. The fact that a participant is interested in participation in a project is perhaps due to the fact that his motivation, background, and

interests are different from non-participants. Without controlling or adjusting for this type of bias, the conclusions from any R&D project again may not be valid in actual application.

3. Proper Tools of Research and Evaluation: When R&D projects are carried out, the basic concern is to examine the effects of program inputs on program outputs. In social and educational programs, especially those with multiple objectives and, hence, multiple outputs, there are no unambiguous measurements of the net effects of an R&D project. An output is a result of the interaction of many socio-demosgraphic, educational and economic forces. A descriptive comparison of one or more gross output performances does not properly control for these interaction forces. A commonly used technique for measuring the

net impact of a program input is the use of multiple regression analysis. Each estimated regression coefficient becomes the net impatt of an input variable on the output variable, holding the effects of other factors constant. Although this procedure is an improvement over gross descriptive comparison, it does not necessarily control for all other variables. In addition, even when these effects can be measured, the questions of costs of the R&D inputs relative to the benefit of the R&D outputs have to be considered. If there are positive educational or economic effects but the relevant educational or economic costs are higher than benefits, a program should not be implemented on economic efficiency grounds. However, it should be noted that a finding of "no positive effect" or benefits less than costs does not necessary mean a negative judgment for a R&D as an informational

exercise. The fact of no significant effect or even negative effect of a program is a contribution to knowledge so that policymakers do not waste resources on the program in the future and alternative program can thus be considered. The important point is that whether a program is effective or not, the method of evaluation should be carried out properly, so the result of implementation is an accurate one.

In conclusion, only if R&D projects satisfy the above criteria will the measured contribution to improve vocational education be reliable. The next section of this paper examines the actual contribution of R&D in vocational education in two aspects. One aspect is to discuss the characteristics and aspects of these R&D projects that satisfy the ideal criteria in actual implementation. The other aspect is to evaluate the extent to which educators and policymakers have made use of these research and demonstration projects.

III. Evaluation of the R&D Projects And Their Actual Impact

The purpose of this paper is not to review all the research and demonstration projects that have been carried out in vocational education. Given time and resource constraints, such a task would be impossible. Rather, this paper will examine the actual impact and contributions of R&D studies with respect to specific inputs into the learning process. For a comprehensive understanding of these R&D studies, the ERIC series on review and synthesis of vocational education can serve as a basic source. Readers may consult with these studies such as those by Lanham and Trytten (1966), Larson (1966), Phipps and Warmbrod (1966), Schaffer and Tuckman (1966), Phillips and Briggs (1969), Wallace (1970), Stromsdorfer (1972) and Miller and Miller (1974).

This paper will not review all these R&D studies, but it will discuss the quality and general findings of the R&D projects reported therein to the extent that

these projects make meaningful contributions to advancing the art and science of vocational education.

Two major types of research projects in vocational education can be discerned: one is research on teaching and learning techniques in vocational education. This type of research considers the type of content which vocational students should learn and how to teach this content most effectively. Such types are development oriented. In most cases, evaluations of these pilot demonstration projects were made so that project investigators could decide whether their implementation should be continued. The other type of research is designed to study the results or outcomes of conventional vocational education. This type of research generally analyzes either the economic costs or benefits of conventional vocational education separately or the joint comparison of these economic costs and benefits. The first of these two types of studies is the concern of this paper.

Research and Demonstration Projects

Among the many hundreds of research and demonstration projects in vocational education, most are small scale and limited in scope to their local environment. Very few demonstration projects provide dramatic evidence about the value of their instructional techniques or content as opposed to extant or conventional content or technique. Even though some of these were reported as successful experiments, their sample sizes were too small to report statistically reliable results. And, their case study nature makes their extension of their reported results to the population at large questionable. What makes the situation worse is that many of these experiments were not properly designed and thus provided dubious results. Regrettably, this is a situation which literally occurs time and time again.

It is best to organize these studies in terms of the way in which they attempted to change student behavior and capabilities via changing the types and mix

of educational inputs. These educational inputs can be grouped in the following broad categories:

1. curriculum;

2. teacher education, teaching methods, or teaching teachers to teach;

3. learning processes, of which a subset is instructional materials and devices;

4. capital equipment and facilities;

5. supportive services, which include guidance, counseling, testing, and labor market information; and

6. innovative input combinations, which include career education.

1. Curriculum.

Curriculum development concerns the specification of the information or knowledge components needed to change behavior or performance in a desired way. Such questions are asked as "What knowledge and skills does one need to become a skilled machinist, airline stewardess, or vocational educator?" Legions of curriculum guides have been devised. Yet few have been tested in an experimental setting. Factor analysis of skill components in non-experimental settings has been used to identify various critical competencies, but the incremental impact of each of these competencies or skill inputs on behavior in almost every case has not been measured. Taxonomies are presented based on expert judgment and the general operational procedure from this point is to extend the curricula to as many locales as possible. Extensive effort is spent on "merchandising" the curriculum packages even though conclusive evidence

of the direction of impact on performance, much less the quantitative impact, is usually lacking. It is heartening to note that the use of experimental evaluation of curriculum design is recognized as a proper approach to improving the art (Warmbrod and Phipps, 1966, p.40), but based on the reported research this appears to be the exception rather than the rule. The implication is that even though newly developed curriculums are often widely adopted, one simply isn't certain of their net educational and economic value. It is not surprising, therefore, that curriculum developers meet resistance to the adoption of their packages by teachers, principals and school superintendents. These parties are usually being asked to substitute a program or curriculum whose costs and results are familiar with an activity which clearly involves new costs but whose benefits are unknown or problematical at best. Thus, we have yet to solve the continuing problem,

for instance, of the content and proper mix of general versus skill-specific training or education. This is a most serious issue but one which as yet has not been properly set forth as a set of testable hypotheses much less analyzed in an orderly scientific fashion.

2. Teacher Education.

While some aspects of teaching clearly are an art and are not subject to conscious policy manipulation, there exist teaching techniques which can improve the effectiveness of a given teacher. Regrettably we must again report that while in general the methodology does exist to evaluate teaching techniques and, hence, establish their net impact, the use of such methods is an exception rather than the rule. The following exerpt is instructive (Phillips and Brigg, 1969, p. 22):

> Schnelle (1967) conducted a study to evaluate the effectiveness of an eight-week summer institute to train instrumentation technology teachers. The institute was conducted at the State

> University of New York Agricultural Technical College at Morrisville, New York, during the summer of 1966. The evaluation of the program was conducted by two committees; a Regional Visitation Committee composed of four men knowledgeable in instrumentation and a Central Evaluation Committee composed of educators and industrialists. These committees concluded that the program was successful and outstanding, particularly in the areas of facilities, dedication of staff, and the technical content presented. Two deficiencies were noted: (a) the heterogeneous background of the participants and (b) the lack of presentations on teaching techniques and methodology.

Panels of experts clearly are needed to establish program objectives and specify the techniques one might adopt to reach the educational objectives of a given program. But, as with any other social or educational program, the informed judgment of such experts, while possible prima facie evidence of gross program impact, is anything but conclusive evidence of net impact and net impact, to repeat the obvious, is what counts. As with curriculum guides, then, the result is a plethora of general notions and techniques all competing for attention and use, but

with little to distinguish among these in terms of their net quantitative impact. We submit that since such expert judgments have pretty well distilled the main strategies of components of potentially successful teaching techniques, coherent experimental designs be used to at least cull out the least effective among these. Time and resources permitting, one can then, perhaps, attempt to measure net quantitative impact more precisely. To those who would argue that the use of experimental design tampers with the destiny and human rights of individuals, we would like to point out that what amounts to a continuing, yet casual "experimentation" also constitutes such tampering and while its lack of purposiveness may make it ideologically less objectionable as a method of establishing knowledge, its results (or rather, its lack thereof) may be more destructive of human destines and potential than more purposive experimentation simply due to the potential delay and lost opportunity or misguided information or advice.

3. Learning Processes.

The big controversy here is between conventional teaching methods and the several variants of self-instruction usually involving programmed queries and responses. Our survey of the surveys here report inconclusive, or rather divergent results. In some cases techniques such as computer assisted learning or simulation exercises are shown to be more effective than conventional techniques (Phillips and Briggs, 1969, p. 22 ff) while other studies have shown no conclusive difference.

> The obvious conclusion emanating from this research effort was that the effectiveness of the inservice self-instructional program could not be verified on the basis of criterion variable analysis. This study, therefore, joins the ranks of the vast majority of investigations which have attempted to assess the differential effectiveness of teaching methods and which have been able to report only "nonsignificant results." Greater confirmation is thus afforded the emerging tenet that it is extremely difficult to empirically demonstrate that one method of instruction is better than another.

It should be clear at the outset that, depending on the technique being offered, the skill or knowledge being imparted, and the teacher and student characteristics involved, we will always find techniques that work in one situation and not in another. This is what one would expect--that a given technique will vary in its effectiveness given the other teaching inputs it is combined with. At present we have no careful summary and codification of the contexts in which, say, computer assisted learning works, and where it doesn't work. We do not, therefore know if computer assisted learning works (or fails) due to factors inherent in it or due to exogenous factors. Certainly, the confusion of these two possibilities is a clear and present danger to our ability to make informed judgments when attempting to extend or generalize such techniques.

A slightly different example of the problem we have at identifying the instructional components or characteristics that improve skill or educational

performance is exhibited by the analysis of skill acquisition in shorthand transcription by Joe M. Pullis (Price and Hopkins, 1970, pp. 54-55). Price and Hopkins report the findings of Pullis as follows:

1. Shorthand dictation achievement is significantly related to the student's ability to construct accurate shorthand outlines.

2. Shorthand transcription ability is significantly related tothe student's ability to construct accurate shorthand outlines.

3. Shorthand dictation achievement is significantly related to shorthand transcription ability.

4. Though shorthand transcription ability is significantly related to achievement in shorthand dictation, it is the student's ability to construct accurate shorthand outlines which enables him to transcribe the outlines which he has written.

Note items 1-3 wherein achievement in a given operation is asserted to relate significantly to a closely related ability. The analysis is circular. The true determinants of each skill are really what is at question. Thus, our knowledge gained from this study is zero

in terms of how to teach shorthand though we do get some predictive ability based on the apparent correlation. But, fundamentally, these observations increase our knowledge of the learning of shorthand insignificantly.

A final example in this entire area should suffice to illustrate how failure to adopt proper investigative techniques makes the ability to acquire meaningful information from demonstration and experimentation projects nugatory and hence, even if widely adopted, of unknown value. Gene R. Daugherty used a single group pre-test/post-test design to test a teaching plan and handbook for teaching beef marketing. There was, as indicated, no control group. The measure of outcome was not whether profits from beef marketing increased but how high the subjects scored on an achievement test after the course. Thus, the effect of intervening variables on performance overtime was not accounted for and no theoretically convincing

link was established between what was measured on the achievement test (even if the net change in test performance would have been large and significant) and any potential increase in profits from beef marketing. (Warmbrod and Phipps, 1966, pp. 56-57). Thus, even if this technique were widely adopted, one wouldn't know what its educational and social significance was.

Careful studies using multivariate analytical techniques across a variety of situations can contribute to a clearer understanding of such issues. In particular, the use of a technique across a variety of situations, thus comprising a form of natural or quasi-experiment, with each situation comprising one observation, could provide the necessary data to sort out confusing but competing interpretations. In the meantime, we must affirm again that what we have to go on is a useful first step in establishing our knowledge, but a step which must be built upon in order to clarify what is really happening.

4. Capital Equipment and Facilities.

Adequate educational facilities clearly are important in the learning process. To cite one authority, however, "..., little definitive research has been done to establish criteria for effective facility planning." (Phillips and Briggs, 1969, p. 25)

Elaborate planning guides for the design and construction of facilities as reported by Phillips and Briggs but the degree to which these reflect the conclusions of actual experimentation or demonstration projects is unclear. (See also Warmbrod and Phipps, 1966, pp. 76-77)

5. Supportive Services.

Guidance. Guidance is hypothesized as being composed of three distinct elements: imparting occupational information; appraisal of this information; and decisionmaking. The ability to assist students in making wise occupational choices is hampered by the fact that we have no clear understanding of what vocational guidance tests measure, though their use is widespread. (Tuckman and Schaefer, 1966, pp. 27-28)

As of 1968, vocational guidance was not widely available, being present in only about half of the Nation's high schools and in most cases the services were inadequate. (Phillips and Briggs, 1969, p. 14) However, this latter judgment is not necessarily based on solid evidence. A study by Robert O. Johnson attempted to test an interdisciplinary approach to vocational guidance which combined elements of English, social studies and vocational guidance. (Price and Hopkins, 1970, pp. 66-67) Regrettably, the author had only 40 observations and no comparison group. Thus, the results of his considerable efforts carry no conclusive weight. In particular, while everyone involved "felt" this program was a "success," a simple Hawthorne effect could have accounted for any gross gains, assuming any objective existence of these at all. These types of demonstration projects are fundamentally untrustworthy as policy guides though they can often be a rich source of testable hypotheses.

A variety of work has been done to determine the personal, psychological and socio-demographic characteristics of various types of vocational education students. Much of this descriptive work is of potential interest for guidance counselors and could conceivably aid in proper matches between students and their potential long-run careers. But much of this work also appears to be of questionable value and a dispassionate observer trained to analyze programs or behavior based on hypothesized structural relationships among program inputs, student and teacher characteristics and program outputs would be hard pressed to discover a rationale for continuing such work. Perhaps one illustration in this regard will suffice to establish the point. One analyst of distributive education students found they visited the school health clinic more frequently than a comparison group. What operational hypothesis underlay the development of this datum? To what end was this datum collected? (Meyer and Logan, 1966, pp. 94 ff)

Finally we come to demonstrations and experiments designed to improve student's knowledge of labor market choices so that they can make more informed decisions about the labor market. These have a long history and have been popular. Many such experiments and demonstrations have been conducted by the Department of Health, Education and Welfare. The Occupational Information System is a current demonstration of this type by the Department of Labor which builds on much of the HEW experience.

Problems with this kind of research are several, however. The basic one involves the establishment of a link between the deliverance of labor market information at one point in the working-education cycle of a young person and its effect on labor market performance once the person leaves school and enters the labor market. Much labor market information decays rapidly in its currency for a given market context so that information learned this year may not

be relevant six months later. Simple business cycle effects or structural shocks such as the current oil crisis can make information obsolescent within weeks. Thus, such demonstration projects should concentrate on determining the most effective way to deliver that information which is relevant to a given labor market at a given point in time. In general, this is not the focus of such projects, however. A meticulous investigation of the relative effectiveness of different delivery systems (educational or informational production functions) are clearly not the rule. Thus, such studies often do little than demonstrate that it is socially, politically and administratively feasible to operate such programs. Their net impacts on ultimate occupational or labor market success are not known. Therefore, even though such projects have been common, their value is not established though prima facie evidence would suggest that they would have some positive impact.

6. Innovative Input Combinations.

Within recent years several new concepts on how to recombine teaching inputs have developed. One's attention is first drawn to team teaching which fundamentally is an application of the principle of division of labor and specialization--a concept used extensively in post-secondary education where a graduate student receives a mix of interrelated and complementary instruction by a set of specialists in specific skill or technical areas. While it is very hard to unravel and identify the marginal contribution of each teaching component on a student's performance due to the joint production involved, again, intuitively team teaching makes sense. It is so widely adopted that documentation of this fact is not of importance here. What is important is the phenomenon alluded to above--joint effects on educational or job performance are difficult to identify and so we haven't any clear idea of the separate effects of team members on performance though the net impact of the team as a whole can be measured.

However, the most widely publicized innovation in input combinations has been Sidney Marland's "Career Education." The National Institute of Education is running a variety of experiments here to test the effects of family-based, employer-based and other innovative career education experiments.

The problems with these experiments have been several, however. Most notable are these: sample sizes are too small; the experimental design integrity has been violated; no clear cut educational delivery system has been established in any of these experiments and the goals, and hence, delivery systems have constantly changed. As an example, the best experiment of the group, family-based career education, exhibits no regularity or uniformity in its educational delivery system or process. Efforts by Moayed-Dadkhah and Stromsdorfer to measure uniform relationships between program costs and intermediate educational outputs have met with failure. (Moayed-Dadkhad and Stromsdorfer, 1975) Apart from several data limitations

the basic reason for this appears to be the diversity of educational treatments being offered as well as their changing structure over the life of the experiment. For instance, there are now 4,000 learning activity packages in 20 different educational or skill areas. There are less than 1,000 observations available to test for the net impact of these learning packages. Given the fact that random assignment procedures have been violated, plus the rather small even if positive effects that may exist, there simply aren't enough observations to detect any measurable effects. The other career education experiments are in much worse shape. Hence, even if these projects are generalized and disseminated throughout the United States we have absolutely no idea of their ultimate educational, social or economic value over and above conventional vocational education approaches. Yet, Miller and Miller claim great things for career education. (Miller and Miller, 1975, p. 55)

The Bottom Line

Table 1 displays a wide variety of projects which have been funded under the Vocational Educational Act and which in many cases have been widely disseminated across society. What do we know of their ultimate educational or social value? Perhaps the following quotes are instructive since they appear to be the most current judgments based on the findings in the literature at this time:

> There were times when it almost seemed as though specific results were not wanted, as if the results might not be what the people who were conducting the projects wished to believe. But part of the problem lay in not having definite information available at the beginning of a project relating to precisely what kinds of data were desired in the reports. Another deterrent has been the time and cost involved in attempting to get evidence of impact. Only recently have valid instruments, in which project directors can have confidence, begun to be developed. To the degree that either the lack of any valid impact measurement techniques or the possibility of negative results has hampered impact research in educational projects, there has been a loss of vital data to educational program management.

TABLE 1

A Sampling of Projects Funded under VEA, Parts C, D, and I

Project Title	First Funded	Original Impact	Current Impact
Aviation Mechanics Project California	1965	Nationwide survey resulted in change of requirements for instruction by FAA.	150 certified aviation schools in U.S., 18 other countries using revised curriculum, 15,912 graduates.
World of Construction - World of Manufacturing Ohio	1965	Complete curriculum in each area including all materials, daily behavioral objectives, field tested in six States.	Programs taught in all 50 States, 3 provinces of Canada, America Dependent Schools in Germany, France, and Italy. 420,000 students, 2,200 schools.
VIEW: Vital Information for Education and Work California	1965	Provided information on microfiche about course offerings and jobs available to students in San Diego County, CA.	VIEW projects in 34 States and Guam, over 7,000,000 students receiving information.

Table 1 - Continued

Project Title	First Funded	Original Impact	Current Impact
TERC: Technical Education Research Centers Massachusetts	1965	Nationwide survey to determine availability of biomedical equipment technology programs. Development of curriculum.	Four major technical curricula being taught in a total of 33 States, also providing technical assistance and curriculum development in 20 other areas.
T4C: Technology for Children New Jersey	1965*	Hands-on experience and career awareness for 572 children in one school district.	50,000 children in 40% of the school districts in New Jersey. Also in New York. Workshops held in at least six other States.
Conference on Implementing Career Development Theory and Research through Curriculum Virginia	1966	Fifty participants from several States discussed career development as a personal growth process. This conference helped provide the background for Sidney Marland's 1971 statement supporting career development theory.	"Career Education" being presented to children in all 50 States. In pilot year, less than 1,500,000 children K-12 were involved Nationwide. Within two years, over 1,200,000 children in one State alone were in pre-secondary guidance and pre-vocational programs and in secondary Vocational Education.
CVIS: Computerized Vocational Information System Illinois	1967	Provided vocational guidance information to students on a 1-1 dialogue with computer basis.	Over 10,000 student uses at original site. 75+ schools adopting this program. Consortium members in 38 States, and 2 other countries,

* Originally funded by State of New Jersey and Ford Foundation because no provisions were made in the Vocational Education Act of 1963 for pre-vocational elementary level programs. Funded under the 1968 Amendments in many areas of New Jersey by 1970.

Table 1 - Continued

Project Title	First Funded	Original Impact	Current Impact
V-TECS: Vocational-Technical Education Consortium of States Georgia	1968	Performance objectives determined for occupational areas, task analysis procedure developed.	Task analysis catalogs developed for over 200 jobs titles. In Florida alone, 246 industrial and 65 technical programs. Expanded to include six other States, with three more expected to join this year.
Occupational Training Information System (OTIS) Oklahoma	1968	Provided manpower demand and supply information to Vocational and Technical Education administrators.	Information to several State agencies concerned with manpower planning, followup of vocational students after one, three, and five years. Personnel training information.
Program Review for Improvement, Development, and Expansion (PRIDE) in Vocational Education Ohio	1970	Initiated in eleven (11) of Ohio's 104 Vocational Education Planning Districts.	Completed program review for 90 planning districts, will have the rest complete within two years. Unemployment rate for vocational program graduates one-fourth the National average for that age group.
SPAN: Systems Program Approaching Non-unemployment of Vocational Students Tennessee	1970	Job Guidance and Placement center including co-op work experience, elementary instructional television series for career exploration.	SPAN being implemented throughout Memphis. Tennessee legislature has passed a bill requiring all high schools to provide Vocational Education opportunities for at least 50% of the students Statewide.

Table 1 - Continued

Project Title	First Funded	Original Impact	Current Impact
Vocational Follow-up System Minnesota	1970	Data gathering instruments developed to provide information on student population, program termination, and student and employer follow-up.	Follow-up data on students from all thirty-three (33) area vocational schools in Minnesota provided to State agencies and area school directors, used in program planning and evaluation.
Mountain Plains Project Montana	1971	Twelve families in pilot project. Total family career education including home management and job training, for disadvantaged families.	Currently enrolling between 199 and 210 families, 480 families have completed the program.
Forecasting Guide: Employment/Enrollment; A Management Information System Project Washington	1971	Development of a method of analyzing and displaying employment and enrollment information.	Highly reliable planning information source used by major State and local educational agencies throughout Washington. Directly influences State Plan. Over 100 occupations analyzed.
Curriculum for Planning (Project Next Step) Utah	1971	Planning guide developed for local school districts. Combined with 5-State project on curriculum planning funded through two other USOE agencies.	Hundreds of workshops conducted in many States to train educators in methods of conducting needs assessments. Statewide commitment to career education in number of States.

Table 1 - Continued

Project Title	First Funded	Original Impact	Current Impact
Toward Accountability Arizona	1971	New guidance and counseling program piloted in 16 schools with 8,200 students.	Systematically planned and evaluated, objectives-based instructional and counseling activities. Methods for measuring outcomes in affective domain determined. Expanding throughout district.
Bread and Butterflies Agency for Instructional Television	1972	Personnel from 34 States wrote portions of career development program - some VEA funded, most using State funds.	Complete program available being used throughout many States and in selected locations in others of the 34.

SOURCE: MILLER, ROBERT and MILLER, LARUE W. (1974) Impact of Vocational Education Research at the Federal and State Levels, Project Baseline, Northern Arizona State University, Flagstaff, Arizona.

Or, to further develop the situation we find ourselves in,

> The tacit assumption seems to have been that the act of distributing money which is used to employ people to generate information will impact some educational system, will provide a service, will, through its consumption, affect some aspect of the economic, social or political system. Of course it will! But simplistic representations of impact should be strenuously avoided....
>
> To report the impact of any intended activity requires more than a report on the activity or even the results of the activity. Before an activity is engaged in, the existing conditions intended to be changed by that activity must be determined. Somehow, the amount of resources required to effect the kind of change intended must be established, the duration of the activity must be approximated, and the general outcome of the impact projected. If the task attempted is too complex or expansive for the limited resources available, then purposeful directions must be determined and implemented into policy statements before any activity is engaged in. And even though the establishment of clear criterion measures before the funding of Nationwide educational efforts may be politically hazardous, they must be made before the efforts reflected in those criteria can be measured.

In short, we do not lack for a richness, variety and ingenuity of ideas. Vocational educators and educators in general deserve considerable credit for their ingenuity in devising various curricula, techniques and educational strategies. They get low marks on being able to tell policymakers what the net impact of such activities are, however. Thus, even though many of these innovations are widely adopted, we can not be sure what the implications of these activities are for the students involved or the nation as a whole.

IV. Concluding Remarks

The ideal method to determine the actual impact of R&D projects on vocational education is to design a questionnaire for Federal and State funding agencies in vocational education and educators and administrators in vocational education. This questionnaire should elicit: (1) information on the extent that these groups are familiar with vocational education R&D findings; (2) the extent that they agree or do not agree with these (3) the extent that their policy decisions or instruction have been influenced by these findings, either by modifying their curriculum content, instructional devices, reorganization of educational programs, student services, or reallocation of funds within the educational system. Many of the available published research results only state their conclusions or recommendations. There is a time-lag for administers and other educators to implement these findings, if any. Even if some of the findings are adopted, there is no explicit or published record to show the actual contributions of R&D in vocational education. Because of

the limited time and resources available, this paper cannot pursue the mail questionnaire survey technique. Instead, this paper has evaluated the criteria for R&D projects that can be implemented and thus made inferences on the extent to which these R&D projects may have affected vocational education.

Based on the literature available, from a positive point of view, the research and demonstration projects have provided general information on cost estimates and benefit-cost comparisons for administrators in planning and allocating funds for vocational education. Some of the demonstration projects have helped modify or improve instruction techniques. However, many limitations of these R&D projects still exist which prevent their having a greater contribution to improving vocational education. These limitations can be summarized as follows: (1) In general, many R&D projects do not have adequate research design or evaluation methodology; (2) descriptive research studies still abound in the literature although regression and correlation techniques have been increasingly applied

in the research; (3) Weakness in survey technique such as probability sampling and meaningful questionnaire design are still evident; and (4) many studies are too weak to have durable impact either because of too small a sample size, too limited in terms of the population tested or the triviality of the problem tested in many demonstration projects.

It should be noted that these stated weaknesses do not exist only in vocational R&D projects (for example, see Goldstein (1972) and Nay et al. (1973)). In fact, these weaknesses exist in many social and educational programs. Unlike R&D projects in the biological sciences, conceptually sophisticated social and educational R&D projects are a relatively recent occurence. R&D in vocational education is still in its infancy. There are many areas where as researchers and educators we can improve the current deficiencies in R&D projects so that they may have a greater actual contribution to vocational education. The statistical

and methodological technology now exists which can quarantee more reliable and generalizable findings for R&D in vocational education. The problem is that, for a variety of reasons, some of which are not valid, it is not always used. It would seem to be an established fact, for instance, that control or comparison groups would be consistently employed, but we find this is not the case. Indeed, the principle is not even universally accepted. Yet, for such expensive research efforts to bear their promised fruit better techniques must indeed be adopted. In the meantime we are left with a wide variance in the quality and applicability of R&D which can only serve to retard rather than facilitate the adoption of valid findings.

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